



# Region 4 Inventory and Monitoring Branch

## Mobile Acoustical Bat Monitoring

### Annual Summary Report

#### 2018

#### Mingo National Wildlife Refuge

The Region 4 Inventory and Monitoring Branch coordinates acoustical bat monitoring on participating National Wildlife Refuges and Ecological Services field offices in Regions 2, 3, and 4. Surveys establish baseline inventories of bat species at each station and contribute to a landscape-level understanding of bat population trends and habitat associations. Bat call data are collected using Anabat SD2 detectors along road-based transects during June and July of each year following the procedures outlined in the Mobile Bat Acoustical Survey Protocol<sup>1</sup>.

This report summarizes bat calls collected along driven survey routes at Mingo National Wildlife Refuge in 2018 and provides annual species detections from 2012 to 2017 for comparison. Calls were classified using the BCID Eastern USA (version 2.7c) software. Automated acoustical bat classification is limited in part by call quality, species filter constraints, and statistical model agreement parameters. We applied a species filter to limit classifications only to those bat species expected to occur at Mingo National Wildlife Refuge during the sampling interval. We considered species classifications conservatively by classifying only those calls with  $\geq 5$  ultrasonic pulses. While we expect that this conservative approach resulted in robust species classifications, it necessarily means that we may underestimate the actual number of bats detected. We geo-referenced calls to the nearest corresponding GPS location collected along the route.

The accuracy of call classification varies among species but is generally reported to be  $> 85\%$  correct. Measures of confidence in species identification are available as a maximum-likelihood estimator p-value for each observed species in the BCID output files included in this report package. BCID software does not classify the following species: Seminole bat (*Lasiurus seminolus*), Northern yellow bat (*Lasiurus intermedius*), or Brazilian free-tailed bat (*Tadarida brasiliensis*). These species generally will be classified to a species with the closest model agreement or classified as “unknown.”

This annual report package contains summary information on route surveys, and a digital folder containing shapefiles and BCID classification output files. Summary tables include all classified species observations including those lacking an associated spatial reference. All submitted raw call data and survey metadata are archived and available on the Mobile Acoustical Bat Monitoring SharePoint site (<https://fishnet.fws.doi.net/regions/4/nwrs/IM/bats>). Bat call files, GPS data, and survey metadata sheets were reviewed for quality assurance prior to generation of this report. Some submitted data were necessarily excluded due to errors identified in the collection processes.

---

<sup>1</sup>U.S Fish and Wildlife Service. 2012. Mobile Bat Acoustical Survey Protocol, U.S. Fish and Wildlife Service, Region 4, Division of Refuges

## Mingo NWR (MngNWR) route

**Table 1: 2018 survey route (MngNWR) summary.**

Survey date	# bat calls	Route completed?	GPS data?	Survey notes
06 Jun	95	✓	✓	
19 Jun	118	✓		Route turn was missed by 30 feet. Recorder turned off while turning around, then restarted.

**Table 2: 2018 survey route (MngNWR) nightly species detection summary. Total route length = 25.4 miles.**

Species	Survey date	# bats detected	Bats mile
Big Brown Bat	06 Jun	10	0.39
	19 Jun	1	0.04
Eastern Red Bat	06 Jun	19	0.75
	19 Jun	17	0.67
Evening Bat	06 Jun	54	2.13
	19 Jun	84	3.31
Little Brown Bat	06 Jun	3	0.12
	19 Jun	3	0.12
Tricolored Bat	06 Jun	7	0.28
	19 Jun	12	0.47
Unknown	06 Jun	2	0.08
	19 Jun	1	0.04

## Species detection summary (2012 - 2018)

**Table 3: Annual survey route (MngNWR) species detection summary, including classified calls without a spatial reference. Total route length = 25.4 miles.**

Species	Year	Total # detected	# surveys	Total bats/mile
Big Brown Bat	2012	8	4	0.08
	2013	3	2	0.06
	2014	4	2	0.08
	2015	6	2	0.12
	2016	10	2	0.20
	2017	6	2	0.12
	2018	11	2	0.22
Eastern Red Bat	2012	115	4	1.13
	2013	12	2	0.24
	2014	20	2	0.39
	2015	56	2	1.10
	2016	43	2	0.85
	2017	43	2	0.85
	2018	36	2	0.71
Eastern Small-footed Bat	2012	2	4	0.02
	2013	0	2	0.00
	2014	0	2	0.00
	2015	0	2	0.00
	2016	0	2	0.00
	2017	0	2	0.00
	2018	0	2	0.00
Evening Bat	2012	216	4	2.13
	2013	71	2	1.40
	2014	44	2	0.87
	2015	76	2	1.50
	2016	97	2	1.91
	2017	103	2	2.03
	2018	138	2	2.72
Hoary Bat	2012	2	4	0.02
	2013	2	2	0.04
	2014	0	2	0.00
	2015	0	2	0.00
	2016	0	2	0.00
	2017	0	2	0.00
	2018	0	2	0.00
Little Brown Bat	2012	22	4	0.22
Continued on next page				

Species	Year	Total # detected	# surveys	Total bats/mile
Northern Long-eared Bat	2013	1	2	0.02
	2014	3	2	0.06
	2015	12	2	0.24
	2016	4	2	0.08
	2017	12	2	0.24
	2018	6	2	0.12
	2012	0	4	0.00
	2013	0	2	0.00
	2014	0	2	0.00
	2015	0	2	0.00
Southeastern Myotis	2016	0	2	0.00
	2017	1	2	0.02
	2018	0	2	0.00
	2012	1	4	0.01
	2013	1	2	0.02
	2014	0	2	0.00
	2015	0	2	0.00
	2016	0	2	0.00
	2017	2	2	0.04
	2018	0	2	0.00
Tricolored Bat	2012	202	4	1.99
	2013	67	2	1.32
	2014	44	2	0.87
	2015	70	2	1.38
	2016	29	2	0.57
	2017	23	2	0.45
	2018	19	2	0.37
Unknown	2012	18	4	0.18
	2013	3	2	0.06
	2014	3	2	0.06
	2015	6	2	0.12
	2016	10	2	0.20
	2017	4	2	0.08
	2018	3	2	0.06

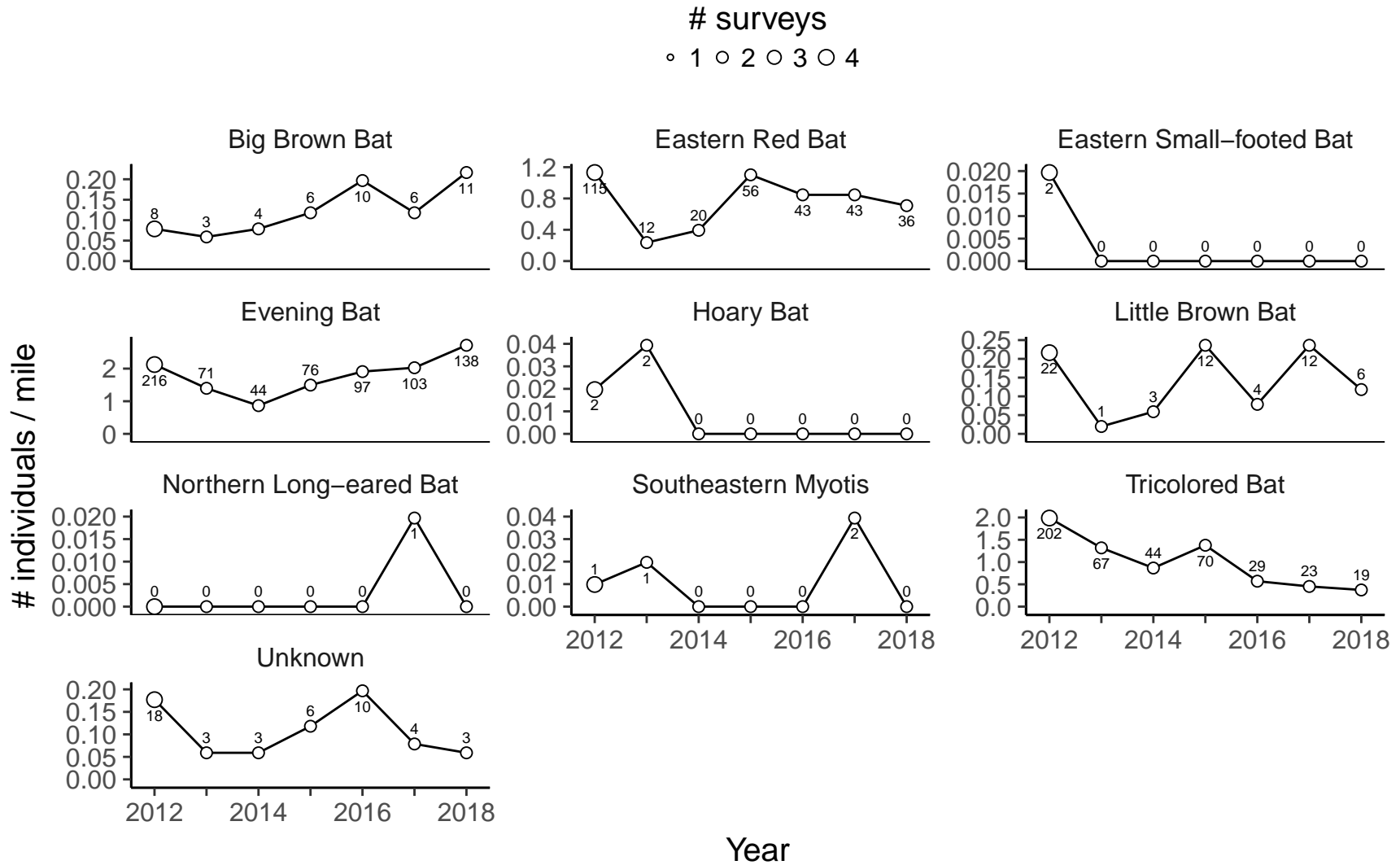
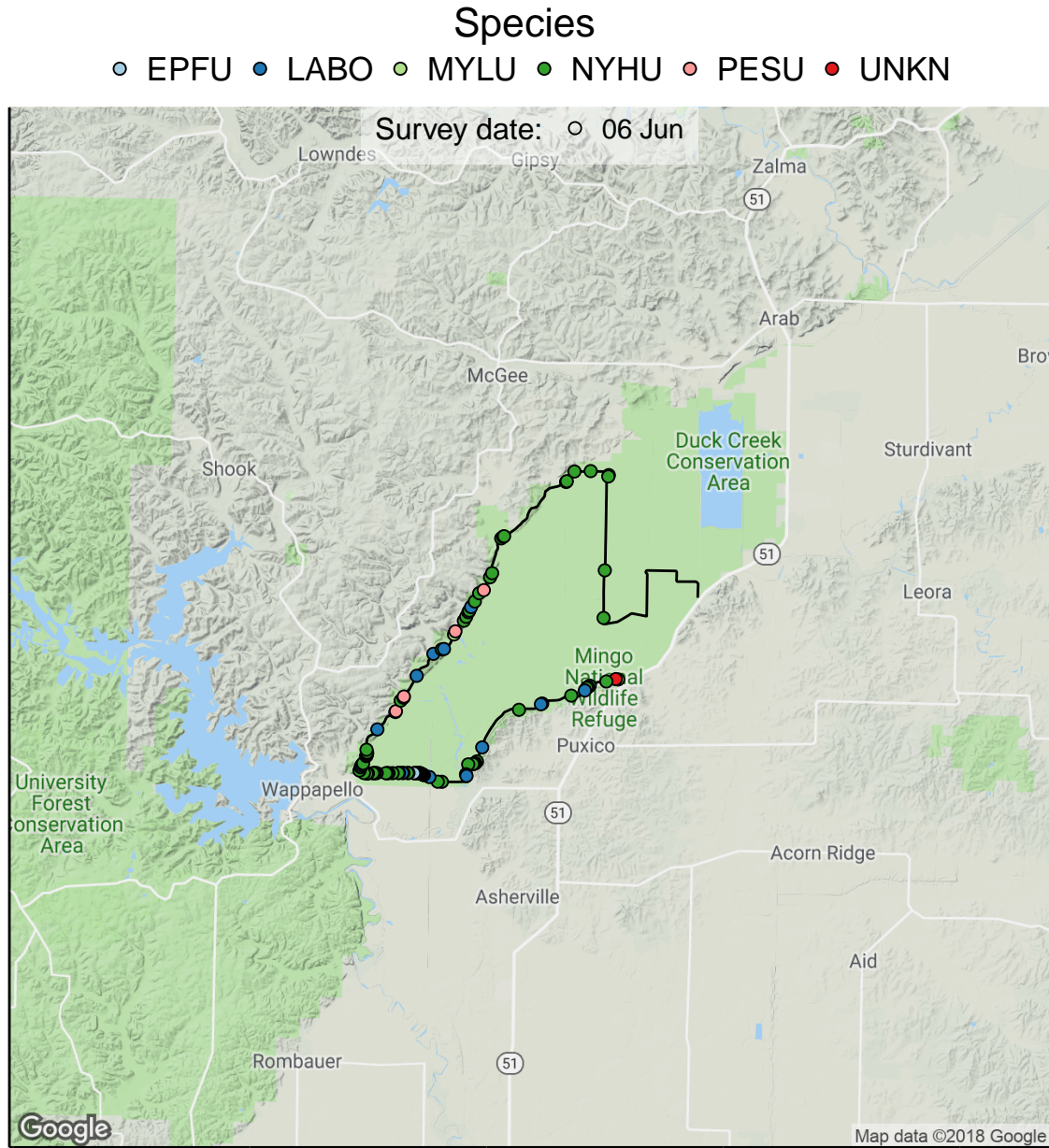


Figure 1: Figure version of the previous table. Detection rates of bat species. Point size indicates the number of surveys conducted for the route. The number associated with each point indicates the total number of individuals detected across all surveys. Total route length = 25.4 miles.



**Figure 2: 2018 georeferenced bat detections superimposed on the MngNWR survey route. 118 calls are not represented due to missing spatial information. Total route length = 25.4 miles.**